

STACKABLE WEIGHT SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims priority from related U.S. Provisional Patent
5 Application Serial No. 60/417,310, filed October 09, 2002, the entire disclosure of
which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

1) Field of the Invention

10 The present invention relates generally to exercise devices, and in
particular to weight plates used in weight training.

2) Description of Related Art

Dumbbells and barbells are inertial force exercise devices with dense
15 body extremities or weight plates. They comprise of a central handle bar for
gripping the devices, with weight plates attached at or near both ends of the bar.
In general, the weight plates may comprise of removable weight plates so that
different or additional plates may be attached as desired to vary the weight of the
device. Dumbbells and barbells with non-removable weight plates comprise of
20 plates permanently attached to their central handle bar.

In either case (removable or non-removable weight plates), when a user wishes to change the amount of weight used for exercise, the user must switch to another higher or lower weight dumbbell with permanently attached weights or change the removable weight plates coupled thereto. This usually requires the user to return the dumbbell to an equipment storage rack to select another dumbbell or weight plates of higher or lower weight. Inherent to most weight training equipment is the fact that they are bulky, difficult to balance and control, and dangerous to handle as the amount of weight increases since users handling them can easily lose control and drop the devices, especially when they have exercised for a while and are fatigued.

In general, weight plates are configured as discs with a center hole, and are usually stored on racks through this aperture. Although floor stacking (or storage) of weight plates is more space efficient, the vertical column of multiple stacked plates on top of one another tends collapse. The traditional weight plates are symmetric around the mid-plane of their front and rear surfaces. That is, the surfaces of the plate adjacent to their center hole (used for coupling the plate to a bar) are generally coincident to the planar surfaces adjacent to the outer rim of the weight plate. This allows the plates to be efficiently mounted on racks in either of the two orientations (front or rear faces), while still allowing the outer rim of each neighboring plate to be flush to one another. This configuration allows

for the maximum number of plates to be stored on a single rack, but works against floor stacking the plates.

Traditional dumbbells with non-removable fixed weight plates feature an end-cap that protrudes from the axial ends of the dumbbell to retain axial tension between the mounted weight plates and the mounting shaft of the dumbbell. The protruding end-caps positioned beneath the mass of the dumbbell are uncomfortable for resting the dumbbell on a user's body. This is a common position attained just before and after completing many exercises. Further more, the protruding end-caps make it difficult to position the dumbbell on either axial end, normal to the ground. This inability to stand the dumbbell vertically along its axis perpendicular to the ground on one end is inherently due to the reduced flat surface area caused by the protruding end-caps, and hence a lack of support for vertical standing of the dumbbell.

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BRIEF SUMMARY OF THE INVENTION

Stackable weight plates comprised of a front and a rear lateral faces with a protrusion at a proximal radial center of the front lateral face and corresponding recess at a proximal radial center of the rear lateral face is provided. The rear lateral face with the recess section at the proximal radial center of a top weight plate in a stack rests (or is stacked) on the front lateral face with the protrusion at a proximal radial center of another bottom weight plate for a column stacking of

the plates. Because each plate is restrained along its center axis by the mating or interlocking of the protruded area of one plate with the recessed area of another weight plate, the stacked plates are therefore generally stable and do not fall due to lateral shearing of the stack.

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When mounted on a handle bar to form an inertial force exercise device, the recessed area of the rear lateral side of the weight plates of the present invention face outward, and house the mounting or fastener mechanism. This way, the mounting mechanism, which may comprise of a fastener and a retention washer, would not protrude from the surface of the plate. This would enable the user of the inertial force exercise device to rest the device on their body without pain or discomfort usually associated with the protruding retention washers of the prior art. In addition, the inertial force exercise device may independently be rested on the floor along the axis of the handle bar perpendicular to the floor.

15 The protruded hubs at the front lateral side of the weight plates, face inward when mounted, and hence create additional space or length between the front lateral faces of the inner most plates in a mounted position on the handle bar. This added space or length between the front lateral faces of the inner most plates allows for a greater range of motion along the axis of the inertial force exercise device for the user wrist, and reduces the possibility of injury if the wrist

20 was to come in contact with the inner most plates.

These and other features, aspects, and advantages of the invention will be apparent to those skilled in the art from the following detailed description of preferred non-limiting embodiments, taken together with the drawings and the claims that follow.

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BRIEF DESCRIPTION OF THE DRAWINGS

It is to be understood that the drawings are to be used for the purposes of exemplary illustration only and not as a definition of the limits of the invention.

10 Referring to the drawings in which like reference numbers present corresponding parts throughout:

Fig. 1 is an exemplary perspective top view of a weight plate in accordance with the present invention;

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Fig. 2 is an exemplary perspective top view of the weight plate cut along the plane of the line A-A illustrated in Fig. 1 in accordance with the present invention;

20 Fig. 3 is an exemplary perspective backside view of the weight plate of Fig. 1 in accordance with the present invention;

Fig. 4 is an exemplary perspective backside view of the weight plate cut along the plane of the line A-A illustrated Fig. 3 in accordance with the present invention;

5 Fig. 5 is an exemplary perspective view of a plurality of stacked weight plates in a column in accordance with the present invention;

Fig. 6 is an exemplary perspective view of the plurality of stacked weight plates cut along the plane of the line A-A illustrated in Fig. 5 in accordance with
10 the present invention;

Fig. 7 is an exemplary perspective horizontal view of an inertial force exercise device with weight plates coupled thereto in accordance with the present invention;
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Fig. 8 is an exemplary perspective vertical view of an inertial force exercise device with weight plates coupled thereto in accordance with the present invention;

20 Fig. 9 is an exemplary side view illustration of an inertial force exercise device with two sets of weight plates of the present invention mounted thereon

showing the hidden washer and the fastener mechanism using dashed lines in accordance with the present invention;

Fig. 10 is an exemplary side view illustration of the inertial force exercise
5 device illustrated in Fig. 9 in accordance with the present invention;

Fig. 11 is an exemplary side view of the upper section of the inertial force exercise device cut along the planes of the lines A-A and B-B illustrated in Fig. 10 in accordance with the present invention;

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Fig. 12 is an exemplary perspective view of a washer in accordance with the present invention;

Fig. 13 is an exemplary perspective view of the washer cut along the
15 plane of the line B-B illustrated in Fig. 12 in accordance with the present invention;

DETAIL DESCRIPTION OF THE INVENTION

Fig. 1 is an exemplary perspective view of a top or front lateral face of a
20 weight plate 2 in accordance with the present invention. The plate 2 is any entity of incremental mass to allow for graduation of lifting resistance. In general, weight plate 2 is comprised of a circular disc of varying thickness or density with

rounded rims or edges 12 at its radial distal ends, and a circular central hole 10 at its radial center. The front lateral face or radial plane of the plate 2 is comprised of a conical protrusion 8 at a proximal end from its radial center, and a radial flat base 4 at a distal end thereof. The radial surface of the conical projection 8 along its radial longitudinal distal ends 6 bevel or slope radially downward towards the flat surface 4 of the plate 2. The conical projection 8, its oblique radial distal end surface 6, and the flat surface 4 of plate 2 are uniform, contiguous, and integral part of plate 2, forming a single piece. The cut-out section of plate 2 along the indicated plane A-A is illustrated in Fig. 2, showing a radially recessed section 18 at its rear lateral face, complementary to the raised conical surface 8 of the front lateral face.

The backside of the weight plate 2, illustrated in Fig. 3 includes the circular central hole 10 at its radial center. The rear lateral face or radial plane of the plate 2 is comprised of a recessed conical center 18 at a proximal end from its radial center, and a radial flat base 14 at a distal end thereof. The radial surface of the concave or recessed conical center 18 along its radial longitudinal distal ends 16 bevel or slope radially upward towards the flat surface 14 of the plate 2. The conical recess 18, its oblique radial distal end surface 16, and the flat surface 14 of plate 2 are uniform, contiguous, and integral part of plate 2, forming a single piece. The cut-out section of plate 2 along the indicated plane A-A is illustrated in Fig. 4, showing the radially protruded or convex section 8 at the front

lateral face, complementary to the recessed or concave conical surface 18 at the plate's rear lateral face.

Both the convex (raised) and the concave (recessed) portions of the
5 above described plate 2 on the respective front and rear lateral faces of the plate
2 allow for vertical stacking of a plurality of weight plates 2 on the floor for
storage, while reducing the tendency for the column of stacked plates to shear
and collapse. In general, floor stacking of plates is more space efficient and
flexible than the large racks found in prior art settings. Fig. 5 is an exemplary
10 perspective view of a plurality of stacked weight plates 2 in a column, with a cut
out section along the plane of dashed line A-A thereof shown in Fig. 6. As
illustrated, the rear lateral face of a top plate at its recessed conical central hub
18 rest on front lateral face of a protruded or convex conical central hub 8 of a
second, bottom plate. This feature allows plurality of plates, independent of
15 weight increment, to be set flush to one another while on top of each other in a
column. The plates are asymmetric along their radial center planes and can be
column stacked when the protruded surface of one plate is placed within the
recessed surface of a second plate, reducing the likelihood of any fall or toppling
from their column stacked orientation. Each plate within the stack is restrained
20 along its center axis by the friction of their interlocked protruded and recessed
conical center hubs, preventing the stacked weight plates from falling due to
lateral shearing of the stack.

Fig. 7 is a horizontal perspective illustration of an inertial force exercise device with the weight plates of the present invention mounted onto a bar 100, and Fig. 8 illustrates the vertical. As illustrated in both Figs. 7 and 8, the front lateral surface 9 of the weight plates comprised of the raised conical center hub 8 mounts onto the handle bar 100 as the inner most conical hub, and the rear lateral surface 17 with recessed conical center hub 18 mounts onto the bar 100 as the outer conical hub. The weight plates may be fastened onto the bar 100 by a variety of mechanisms, including the use of the illustrated fasteners 50 in combination with a retention washer 20. Most prior art fastener mechanisms use an additional smaller weight plate in combination with a washer and a fastener to mount prior art weight plates onto the bar 100. The recessed center hub 18 of the weight plates of the present invention enable mounting of the plates onto the bar 100 without the use of the additional smaller weight plate. This reduces the number of parts (pieces) used for assembling the inertial force exercise devices. The recessed areas 18 of the weight plates of the present invention house both the washer 20 and the fastener 50 such that the fastener 50 is flushed with and rests within the washer 20, and the washer 20 itself is flushed with and rests within the recessed area 18. This way, the mounting mechanism does not protrude from the surface of the plate.

Fig. 9 is an exemplary side view illustration of an inertial force exercise device with two sets of weight plates of the present invention 2, 102 mounted at one distal end of the handle bar 100, and two sets of weight plates 200, 204 mounted at another distal end thereof, showing the hidden washer 20 and the fastener mechanism 50 by the use of the dashed lines. As illustrated, the rear lateral face with recessed conical center hub 18 of the inner most plate 2 mates with the front lateral face with the protruded conical center hub 108 of the second outer most plate 102. The recessed conical center hub 118 of the outer most plate 102 accompanies the retention washer 20 and the fastener 50 such that their volume is completely recessed below the lateral surface 114 of the outer most plate 102. Because the retention washer 20 does not protrude from the surface of the plate, the user of the exercise device is able to rest the axial ends of the device on their body without pain or discomfort usually associated with protruding retention washer. In addition, the inertial force exercise device may now be independently rested vertically on a flat surface with the axis of the handle perpendicular thereto with the outermost plate securely supporting the exercise device. This position is highly desired when resting the inertial force exercise device between exercises, or preparing for use before lifting the devices for the exercise. In addition, the recessed region of the plates for the retention washer protects it from impact with other inertial force exercise devices or equipment, eliminating the possibility of forming dangerous cuts or burrs.

Fig. 10 is an exemplary side view illustration of the inertial force exercise device illustrated in Fig. 9, and Fig. 11 is an exemplary side view of the upper section of the exercise device illustrated in Fig. 10 cut along the planes of the lines A-A and B-B. As illustrated in Fig. 11, the retention washer 20 and the fastener 50 completely rest within the recessed area 118 of the second outer most plate 102. The retention washer 20 along with the fastener 50 retain axial tension between the weight plates 2, 102 and a mounting shaft (within handle bar 100). Referring to Fig. 10, as shown the washer 20 and the fastener 50 are completely hidden from view because they are flushed within the recess 118 of plate 102. An added advantage to having the front lateral side protruded hubs is the creation of the additional space or length between the front lateral faces of the inner most plates 2, 200 when mounted on a handle bar 100. As indicated by the dashed line 101, the upper most offset mounting face of these raised conical hubs allow the radial outer edges of the plates 2, 200 to be further from the radial center plane of the handle 100 (as indicated by the longer dashed line 103) when in use. This added space or length between the front lateral faces of the inner most plates 2, 200 allows for a greater range of motion along the axis of the inertial force exercise device for the user wrist, and reduces the possibility of injury if the wrist was to come in contact with the inner most plates 2, 200 on either side of the handle 100. Therefore, this feature reduces the likelihood of wrist injury due to the inner most plates 2, 200 contacting the user.

Figs. 12 and 13 are exemplary perspective view of a washer 20 in accordance with the present invention, with Fig. 13 showing the same washer 20 cut along the plane B-B illustrated in Fig. 12. Washer 20 is comprised of a central radial recessed compartment or housing having a flat horizontal radial base 32 and a vertical radial wall 30 normal to base 32. The head of the fastener 50 mounted on the inertial exercise device rests within this recessed region, with the fastener shaft passing through the fastener clearance aperture 34 to securely couple to the shaft of the exercise device within the handle 100. The fastener clearance hole 34 is comprised of a radial wall 36 having an appropriate height or thickness for durability. The washer 20 is further comprised of another slightly recessed region 26 above the wall 30 used for indication or printing of identification information for the inertial exercise device, such as its weight. The regions 24 and 22 comprise the body of the washer with region 22 being the lower straight (or vertical) region and region 24 the upper (rounded) slanted area, ending at an indentation 28. The washer 20 is there to house the fastener 50 in its recessed region comprised of the base 32 and wall 30.

While illustrative embodiments of the invention have been described, numerous variations and alternative embodiments will occur to those skilled in the art. For example, the inertial force exercise device may comprise of dumbbells or barbells. The weight plates illustrated may comprise of removable weight plates so that different or additional weight plates may be attached as

desired to vary the weight of the device. They may also comprise of non-removable weight plates permanently attached to the central handle bar of an inertial force exercise device. Although illustrated as circular, the weight plates may comprise of any shape, size, and weight appropriate for exercise. The

5 shapes may include, but not be limited to, any four sided or polygon shape weight plates. In addition, both the recessed and the protruded hubs of the plates of the present invention need not be conical, and may comprise of any shape appropriate for securely stacking the plates on top of one another in a column. Further more, the recessed or protruded regions need not be located at the radial

10 hub or center of the surfaces of the weight plates. The protrusions or recesses may be plural and lined along radial distal ends (from the radial center) of the plates. Although this feature may allow column stacking of the plates, there it would lack a recessed area for housing the retention washer. Such variations and alternate embodiments are contemplated, and can be made without

15 departing from the spirit and scope of the invention.